

Appl. No. 10/605,678
Amdt. dated December 19, 2005
Reply to Office action of September 22, 2005

REMARKS/ARGUMENTS

1. Rejection of claims 1 and 6-9 under 35 U.S.C. 103(a) as being unpatentable over Liaw (US 6,448,140B1) in view of Gocho (US 6,258,654B1) and further in view of Ota et al. (US 6,521,963B1):

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Claim 1 of the present application is not amended and listed hereinafter for reference.

Claim 1. A method of forming a gate structure comprising:

10 providing a substrate, and consecutively forming a gate oxide layer, a polysilicon layer, a silicide layer, and a cap layer onto the substrate; patterning the cap layer and the silicide layer to form a first stacked gate structure;

15 removing a portion of the silicide layer exposed on sidewalls of the first stacked gate structure for forming a recess on the sidewalls of the first stacked gate structure;

filling a passivation layer into the recess to form a second stacked gate structure; and

removing the polysilicon layer and the gate oxide layer using the second stacked gate structure as a mask.

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The method recited in claim 1 is characterized by filling a passivation layer into the recess to form a second stacked gate structure, and removing the polysilicon layer and the gate oxide layer using the second stacked gate structure as a mask.

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Regarding US 6,448,140B1, Liaw discloses a method of forming a MOSFET device. Liaw teaches forming a gate insulating layer 2, a polysilicon layer 3, a tungsten silicide layer 4, and a capping layer 5, and

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etching these layer to form a gate structure (Fig.1). Liaw further teaches forming lateral recess 8 in the tungsten silicide layer 4 (Figs.2-3), and thermally growing a thick silicon oxide component 9c on the sides of the lateral recess 8. However, the lateral recess 8 is formed while both the tungsten silicide layer 4 and the polysilicon layer 3 have been etched. Therefore, the silicon oxide component 9c filled into the lateral recess 8 cannot possibly be used as an etching mask, which is different from the function of the passivation layer of the present application.

Regarding US 6,258,654B1, Gocho discloses a method of manufacturing a semiconductor device. Gocho teaches etching a tungsten silicide layer and a polysilicon layer of a gate structure in two steps. Nevertheless, Gocho does not either disclose any teachings of using a passivation layer filled into a recess of a gate structure as an etching mask.

Regarding US 6,521,963B1, Ota teaches using an oxide film 3A as an etching stopper, not a mask. The applicant quotes col. 12, lines 62-67 of Ota's teachings as follows:

"Next, the polysilicon layer 4A is patterned by anisotropic etching using the silicon nitride layer 12B and the silicon oxide film 3A as hard mask or etching stopper (see FIG. 15). At this time, as shown in FIG. 15, the part of the polysilicon layer 4A shown in FIG. 14 which is located under the metal layer 50C and the silicide films 15 remains as a polysilicon layer 4B."

Since the oxide film 3A is located under the polysilicon layer 4A, it is impossible to use the oxide film 3A as a mask. What Ota means should be

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the silicon nitride layer 12B is a mask, and the oxide film 3A is an etching stopper. Therefore, Ota does not teach forming an oxide in an indentation of a metal layer overlying the polysilicon as the Examiner recites in the Office action. The applicant believes the Examiner might misinterpret the
5 silicide film 15 as the oxide film 3A.

It can be seen that none of the cited arts has disclosed filling a passivation layer into a recess on sidewalls of the gate structure and removing the polysilicon layer and the gate oxide layer using the
10 passivation layer as a mask. Therefore, it would not have been obvious to those skilled in the art to implement the method of claim 1 in view of Liaw, Gocho and Ota. Claims 2-3 have been cancelled. Claims 6-9 are dependent on claim 1, and should be allowed if claim 1 is found allowable. Reconsideration of claims 1 and 6-9 is therefore respectfully requested.

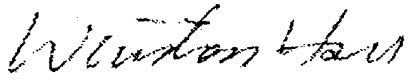
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2.Rejection of claims 4-5 under 35 U.S.C. 103(a) as being unpatentable over Liaw (US 6,448,140B1) in view of Gocho (US 6,258,654B1) and Ota et al. (US 6,521,963B1) as applied to claim 1 above, and further in view of Curello (US 6,503,844B2):

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Claims 4-5 are dependent on claim 1, and should be allowed if claim 1 is found allowable. Reconsideration of claims 4-5 is therefore respectfully requested.

25 Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

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Sincerely yours,



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